European Patent application EP 80 906 describes a process for the production of polyester filament yarn for technical applications by melt-spinning a polyester-containing polymer in which all process elements are covered in a single process pass. Such a process is also known as a one-step process. It is indicated in this publication that in such a process it is preferred to select a winding speed of less than 5500 m/min, since higher winding speeds will give rise to filamentation and difficulty in operation.

C2

Page 2, lines 1-7, delete current paragraph and insert therefor:

U.S. Patent No. 4,491,657 also discloses the process mentioned in the opening paragraph. This patent states that the winding speed of the yarn in such a one-step process is not less than 6.5 km/min. However, there are no examples in this patent of polyester filament yarns for technical applications made by such a one-step process at such a winding speed, nor is there any teaching on how to solve the problems which were found to occur when making polyester filament yarns for technical applications at such winding speeds.

C3

Page 2, line 14, insert a new heading as follows:

--SUMMARY OF THE INVENTION--

C4

Page 2, line 20, insert a new heading and a new paragraph as follows:

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

C5

The invention pertains to a process for manufacturing polyester filament yarn for technical applications by spinning a polymer over 90% of the chains of which are composed of ethylene terephthalate units, with the spinning process having the following elements:

- extruding the polymer in the molten state through a spinneret plate,
- passing the thus formed filaments through a heated zone and a cooling zone in that order,
- fixing the filament speed,
- drawing the filaments to a length of 1.5 to 3.5 times their original length, and

C5

- winding the resulting filament yarn,

with all elements being covered in a single process pass.

Page 2, lines 21-25, delete current paragraph and insert therefor:

C6

The invention consists in that when manufacturing polyester filament yarn for technical applications in the manner described in the above paragraph,

- the filaments prior to being drawn have a crystallinity smaller than 16% and
- the winding speed of the yarn is larger than 6000 m/min.

Page 3, lines 10-17, delete current paragraph and insert therefor:

C7

It is preferred, when making polyester filament yarn for technical applications according to the invention, to employ polyester polymer at least 90% of the polymer chains of which are composed of ethylene terephthalate units and which has a relative viscosity (η_{rel}) of 2.04 to 2.60, preferably of 2.04 to 2.42, more in particular of 2.15 to 2.35. All other process conditions remaining unchanged, a lower relative viscosity of the polymer will generally lead to a lower crystallinity of the undrawn filaments.

Page 3, lines 19-27, delete current paragraph and insert therefor:

C8

It is preferred, when making polyester filament yarn with advantageous use properties according to the invention, to employ polyester polymer with a DEG (diethylene glycol) content of less than 2.5 wt.%, especially of less than 1 wt.%, more particularly of less than 0.8 wt.%. This can be achieved, e.g., by using dimethyl terephthalate as one of the constituents in the polymerization reaction. All other process conditions remaining unchanged, a reduction of the DEG content in the polymer will generally lead to an increase in the crystallinity of the undrawn filaments.

Page 4, line 31 to page 5, line 5, delete current paragraph and insert therefor:

C9

To minimize the differences among the filaments in the bundle as much as possible, it is preferred that the spinning orifices be distributed over the spinneret plate in a regular

pattern. The capillary inlet opening may be variously shaped, e.g., conically, like a trumpet, or in some other shape known to a skilled person, to facilitate the polymer inflow. The capillary outlet opening preferably is cylindrical, the length/diameter ratio (L/D ratio) being 0.5 to 5, more particularly 1 to 3. Alternatively, the capillary's shape may be such as will exert a positive, constant elongation of flow on the polymer stream.

C9

Page 6, lines 5-8, delete current paragraph and insert therefor:

The length of the heated zone ranges from 0.05 to 1.00 m, more particularly from 0.15 to 0.50 m. All other process conditions remaining unchanged, extending the heated zone will generally result in a reduction of the crystallinity of the undrawn filaments.

C10

Page 8, lines 1-11, delete current paragraphs and insert therefor:

To measure the crystallinity of the undrawn filaments, the yarn has to be wound after the speed of the bundle has been fixed. The crystallinity of the undrawn filaments (the so-called as-spun product) can be determined as indicated in this description. As was stated earlier, the crystallinity of the spun product is smaller than 60%. It was found that if crystallinity of the undrawn filament is 5 to 14%, preferably 7.5 to 12%, a yarn can be obtained according to the process of the invention which after it has been made into a cord and the cord subjected to the conventional treatments known to the skilled person to make it suitable for use in rubber articles subjected to dynamic load, e.g., pneumatic tires for cars, will possess a unique combination of properties, such as dimensional stability, breaking toughness, and strength.

C11

Page 8, lines 12-15, delete current paragraph and insert therefor:

Also other properties of the as-spun product, such as the birefringence (Δn_s), can be measured. As-spun product obtained in the aforesaid manner preferably has a birefringence in the range of 0.030 to 0.120, more particularly in the range of 0.040 to 0.080.

C12

Page 8, lines 17-27, delete current paragraph and insert therefor:

C13

In the process according to the invention for manufacturing polyester filament yarn for technical applications the as-spun product is not wound, but drawn immediately after the spinning speed has been fixed. The bundle is guided from the first pair of godets to a next godet or several godets, the so-called second pair of godets. The speed of the second pair of godets is set such that between the first and the second pair of godets the bundle is drawn 1.3 to 3.5 times, preferably between 1.5 and 2.5 times. To facilitate the drawing of the bundle, the bundle may be fixed between the first and the second pair of godets, e.g., with the aid of a drawing point localiser. The drawing point localiser used may be a blower or a cyclone.

Page 9, lines 3-9, delete current paragraph and insert therefor:

C14

If the bundle is passed from the second pair of godets to a next godet or several godets, the so-called third pair of godets, without being drawn between the second and the third pair of godets but rather, say, relaxed, the temperature of the second pair of godets preferably is selected in the range of 200° to 250°, more particularly in the range of godets preferably is 0.1 to 10% lower than the speed of the second pair of godets. The temperature of the third pair of godets preferably is selected in the range of 140° to 200°C.

Page 11, lines 1-5, delete current paragraph and insert therefor:

C15

Next, there is applied to the resulting greige cord a water-dispersed blocked isocyanate, e.g., a dispersion of 5.5 wt.% of blocked diisocyanate, such as caprolactam blocked methylene diphenyl isocyanate, in an aqueous solution of an epoxide, e.g., an aliphatic epoxide. After this the cord is dried for 120 seconds in a hot-air oven at a temperature of 150°C and under a load of 20 mN/tex.

Page 12, lines 6-20, delete current paragraph and insert therefor:

C16

Three pieces of as-spun product are knotted and cut on either side of the knot, giving a sample length of 0.5 to 1 cm. The samples are washed in petroleum ether to remove the

finish if any, and then introduced into a Davenport column containing a mixture of n-heptane and tetrachloromethane of a temperature of 23°C, which column has a virtually linear density gradient with a range of 80 kg/m^3 over a difference in height of at least 60 cm. Gauge balls of a known density have been distributed evenly over this range. The position of the gauge balls and the samples is read six hours after the samples have been introduced into the column. By fitting the position of the gauge balls to a polynome of a third degree, the density gradient is determined with each measurement. Using the fitted density gradient, the density of the samples can be determined from the position of the samples in the column. The average density of three samples constitutes the density of the as-spun product.

C16

Page 13, line 29- page 14, line 4, delete current paragraph and insert therefor:

C17

The carboxyl end groups content can be determined by dissolving about 0.8 g of polymer sample in 50 ml of o-cresol at 125° ± 2°C for 15 ± 2 minutes. After being cooled to room temperature, the solution is diluted with 30 ml of chloroform. After the addition of 0.3 ml of indicator solution (1 g of bromocresol green in 250 ml ethanol, diluted with chloroform to 1 l) the solution is titrated (monotone) with an ethanolic potassium hydroxide solution (0.03 mole/l) at a wavelength of 620 nm (in transmission). The equivalence point corresponds to the point of inflection of the obtained titration curve. A blank determination is carried out in the same manner.

Page 14, lines 5-16, delete current paragraph and insert therefor:

C18

T_g and T_m can be determined with the aid of a Perkin Elmer DSC-7 Differential Scanning Carolimeter. To this end, first of all, the temperature is calibrated at the onset values of the melting of indium (156.6°C) and zinc (419.5°C). Next, an aluminum crucible containing about 4 mg of polyester sample is heated at a rate of 20°C/min to 290°C and kept at this temperature for 3 minutes. The crucible and its contents are then quickly cooled by chilling in liquid nitrogen before being heated at a rate of 10°C/min. The difference in heat

flow between this crucible and an empty reference crucible are recorded in the form of a thermogram. The midpoint of the sudden increase in heat flow at around 80°C constitutes the glass transition temperature T_g, the peak maximum at around 252°C constitutes the polymer's melting point T_m.

C18

Page 16, lines 3-24, delete current paragraph and insert therefor:

C19

Polymer relative viscosity	2.26	2.31	2.23	2.29	2.29	
Polymer line temperature (°C)	305	314	307	311	306	
Spinneret plate						
- # orifices	280	212	280	280	280	212
- orifice diameter (µm)	500	500	400	400	400	500
Heated tube						
- temperature (°C)	300	300	300	300	300	300
- length (cm)	28	28	20	20	20	24
Cooling air						
- temperature (°C)	40	40	20	20	20	60
- relative humidity	65	65	65	65	65	65
Cooling zone						
- length (cm)	75	75	90	90	90	
- type	A	B	C	C	C	
As-spun yarn crystallinity (%)	7.3	9	7	18	<1	12.5
Drawing zone						
Godets pair 1						
- temperature (°C)	56	51	80	80	80	
- peripheral velocity (m/min)	3344	3525	3525	4525	2625	4000
Godets pair 2						
- temperature (°C)	235	235	235	235	235	235
- peripheral velocity (m/min)	6700	7035	7035	7425	6240	7300
Godets pair 3						
- temperature (°C)	160	160	160	160	160	160
- peripheral velocity (m/min)	6690	7030	7025	7415	6230	7290
Winding speed (m/min)	6482	6825	6798	7200	6034	7098

Page 17, lines 1-8, delete current paragraph and insert therefor:

C19

Table II
Properties of the resulting polyester filament yarns

Example	1	2	3	4	5	6
Yarn type	A	B	A	A	A	B
Linear density (dtex)	1114	1120	1109	1134	1102	1115
Breaking tenacity (mN/tex)	704	694	689	619	701	662
Elongation at break (%)	13.2	13.3	14	17.4	13.7	14.2
Breaking toughness (J/g)	59	60	62	78	59	65
Shrinkage 177°C	5.4	5.7	4.8	3.7	5.9	5.8

Page 17, lines 4-21, delete current paragraph and insert therefor:

C20

Table III
Properties of the resulting cord

Example	1	2	3	4	5	6
Linear density (dtex)	3660	3693	3654	3715	3593	3463
Breaking tenacity (mN/tex)	597	597	592	514	588	574
Elongation at break (%)	19.1	19.4	19.2	23.6	17.4	20.8
Breaking toughness (J/g)	68	69	66	82	54	75
Shrinkage (HAS)	1.55	1.61	1.50	1.34	1.91	1.57
DSF	119	115	123	139	98	118
Qf	138	144	124	190	<0	175

IN THE CLAIMS:

Please replace claims 21-24 as follows:

C21

21. (Amended) A cord comprising polyester filaments, wherein the cord has the following properties:

- breaking tenacity ≥ 570 mN/tex,

- dimensional stability > 110, and

- quality factor > 50.

22. (Amended) The cord according to claim 21, characterised in that the quality factor is larger than 100.